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ABSTRACT

The Education Network of Ontario (ENO) is a telecommunications corporation creating an access and applications network for and by Ontario's 130,000-member education community. When educators register with ENO, they receive full industry-standard Internet and Intranet services in English and French. ENO/REO works from school or home. Statistics such as 100,000 teacher members, over 23,000 logins a day, 250,000,000 minutes a month of online time, and over 100,000 mail or news messages per day are commonplace. Self-nominating teachers lead projects that deal with content creation, classroom projects and technology exploration. Results are as varied as a database of parent letters to go with report cards, solutions to keep small children exercised and content in ultra-cold winter months, an Internet radio station and investigation of video and voice technologies as well as pedagogical practices to support professional development. ENO trains teachers who now understand the need for, and use of, a sophisticated variety of applications and content to support and motivate students in the online environment. The result of this support is a classroom project model that is firmly based in curriculum but created in a way that the students and teachers use access to the Internet and other technologies to enhance learning of subject matter and processes, and not the technology itself. The ENO project model is supported by an automated application so teachers need not become involved in Web functions and software operations themselves. They do not need to understand Web site creation or even negotiate Web hosting with their school or District School Board. In this way, they work from the outset with the skills and experience they already have and they add knowledge of online processes and course management only as they need them in practice. Many project leaders graduate from this initial template to major Web site creation. Because ENO is its own Internet and Intranet Service Provider, it has enabled teachers to create and use a continuously evolving "bootstrap" model to support diverse, creative activities--projects, group work, lessons and student-to-student exchanges at every level of instruction. (Author)

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Education Network of Ontario: Content/Curriculum Models for the Internet-connected Classroom

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Abstract

The Education Network of Ontario (ENO) is a telecommunications corporation creating an access and applications network for and by Ontario's 130,000-member education community. When educators register with ENO, they receive full industry-standard Internet and Intranet services in English and French. ENO/REO works from school or home. Statistics such as 100000 teacher members, over 23000 logins a day, 25000000 minutes a month of online time, and over 100000 mail or news messages per day are commonplace. Self-nominating teachers lead projects that deal with content creation, classroom projects and technology exploration. Results are as varied as a database of parent letters to go with report cards, solutions to keep small children exercised and content in ultra-cold winter months, an Internet radio station and investigation of video and voice technologies as well as pedagogical practices to support professional development.

We train teachers who now understand the need for, and use of, a sophisticated variety of applications and content to support and motivate students in our online environment. The result of this support is a classroom project model that is firmly based in curriculum but created in a way that the students and teachers use access to the Internet and other technologies to enhance learning of subject matter and processes, and not the technology itself.

The ENO project model is supported by an automated application so teachers need not become involved in web functions and software operations themselves. They do not need to understand web site creation or even negotiate web hosting with their school or District School Board. In this way they work from the outset with the skills and experience they already have and they add knowledge of online processes and course management only as they need them in practice. Many project leaders graduate from this initial template to major web site creation. Because we are our own Internet and Intranet Applications Service Provider, we have enabled teachers to create and use a continuously evolving 'bootstrap' model to support diverse, creative activities – projects, group work, lessons and student-to-student exchanges at every level of instruction.

1. Introduction/Context

The initial stage of the Education Network of Ontario (ENO) was a UNIX-based, cross-platform, TCP/IP distributed network which provided bilingual (English and French) electronic mail, moderated conferencing (facilitated newsgroups), and database and Internet access across Ontario. It consisted of a bulletin board system with just eighteen members in 1993 and has grown to register more than 100,000 teachers, administrators, trustees and education faculty. This now constitutes nearly the complete K-12 education personnel of the province.

The organization, a public sector Internet and Intranet Applications Service Provider (the second largest in the province), has moved from a project for the Ontario Government

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to become an independent not-for-profit corporation selling services to various levels of government and private and public sector organizations in Canada and abroad.

The project retains dial access from any educator's home or school location in Ontario as well as a full set of mail and newsgroup services. However, to assist teachers with implementation and to resolve issues of the blocking of traditional newsgroups, ENO is structured to enable browser-based moderated Intranet newsgroups and model classroom projects with interactive web creation scaled to accommodate hundreds of thousands of teachers and students as they develop creative, commercial level content. A bilingual call centre supports all of the members and a web site supplies automated tools for registration and classroom project creation.

2. Statistical Notes

Quantitative analysis tells us that our membership of 100,000 educators uses the dial access on average 20000 times a day. Statistics show total online time of nearly 20,000,000 minutes a month from the dial clients. This is in addition to access from school or office LANs and other service providers. Our servers handle as many as 100,000 messages a day. Some of our classroom activities sites register 30,000 hits a day during peak activity. Our records show that teachers have a sustained interest in the Internet and ENO resources, with 80% of the connect time registered after school and throughout the night. Any one of the hundreds of teachers involved in an 'ENO' classroom project, either in creation or participation, is using home or library access after-school hours because of the classroom pressures of their days.

3. Teachers' Practices

Our anecdotal analysis and day-to-day experiences tell us a great deal about how educators use this suite of services. One focus of the teachers continues to be moderated conferences/discussion groups that they open to solve such endemic concerns as 'local' versus 'standardized' evaluation, reporting to parents, community work/learn programs, and general subject-based or level-based curriculum issues such as primary school or science teaching. Whenever a new provincial license for software is purchased, a discussion group is opened in which the technical support team from the vendor can discuss issues of use and technical implementation.

Smaller groups of teachers voluntarily initiate a series of professional activities such as writing primary school curriculum units based on concepts such as two dimensions – measurement, journaling, drawing, and electronic and snail mail. This arose from a successful example, the web-based project devoted to showing young students how to conceptualize two dimensions with a central fictional character called 'Flat Stanley'. After the provincial collaboration, teachers mount and maintain the curriculum units on the ENO/Flat Stanley web site. This project is now international with thousands of schools and hundreds of thousands of students participating. Teachers in other jurisdictions are beginning to write curriculum modules and asking for them to be added to the site.

4. Classroom Projects

One of our largest projects involves over 100 schools and 4000 students across Canada. The Canadian National Marsville Program is a complete online and face-to-face environment. It is a content, activities and teacher professional development project based on the concept of intermediate-level students in a simulation of creating a living environment for themselves as pioneer astronauts and settlers of Mars. Students work through four months of content and activities to ensure their survival as Mars settlers. They upload team mission patches and then their air, water, energy, communications and food supply system drawings to their team's web pages. They and their teachers use the web to access content, activities and mentors' comments from companies such as Spar Aerospace or Macdonald Detweiler and the Canadian Space Agency. Both students and teachers use their personal Intranet accounts to use email and discussion groups to communicate with one another as they improve their devices for space exploration and prepare for the final 'link-up' day. Using technology applications such as newsgroups for sharing and interactive

web authoring prior to the face-to-face event enhances classroom learning. It is not an add-on or a distracter to normal classroom routines.

5. Project Model

The pedagogical model that is the basis for Canadian National Marsville is based in many years of practice, is demonstrably sound, and produces students who are motivated to learn. We have both system-derived and anecdotal evidence of increased achievement. We use this model of sophisticated technology integration, as well as a wealth of offline activities into problem solving simulations, for most of our funded classroom activities.

The following are the parts of the model with explanatory notes. It should be mentioned that the model is not linear and that teachers and curriculum specialists begin in a number of different ways and places in the model. We do ask that ENO project leaders, before they commence, consider all of the parts of the model, even if some segments are eventually deemed non-essential. To aid in understanding, I will use a consistent environmental problem example.

Problem

In this phase, the teacher determines the area of concentration of study. If the student group is at the elementary level, this will naturally be an integration of many disciplines. If the secondary curriculum area is determined to be science, the problem might be the issue of the level of pollution of the local river and feeder water. In all cases, it is preferable if there is more than one teacher and more than one discipline strength involved in the project. The students should pick the final problem or it should be incredibly interesting to students because it is a problem that is local and newsworthy and it starts with their knowledge of, and interest in, the issues of the project.

Scenario

The teachers then create a simulation or scenario into which the students can place themselves as they seek first information and then solutions. In the river pollution example, the scenario would involve a condition of the local river, a series of industries involved in proper and improper waste management, for instance, and the governmental agencies responsible for the river's water quality. The students could form the waste management and biological/chemical company consulted by local industries to study the issue. Another group of students could be the governmental agencies responsible for the river and local water quality. A group of four to six teachers, each with a different area of expertise and a shared commitment of time and resources for the project undertakes the development of activities that appeal to a large number of students since they will blend science with the study of legal regulations and the government as these relate to water. This embeds the knowledge of ground water and its properties and occurrence in the world of governance and political science. Because of the way it is framed from the teachers' initial plan, students become informed, responsible citizens mobilized to protect the environment, even as they come to understand the scientific principles which underlie their insights and conclusions

Team Roles

The scenario will determine the number and types of roles that can be given to students. In the river pollution example, the company would need a series of officers whose different skill sets might be mathematics (Chief Financial Officer), science (chemists, zoologists and botanists investigating the quality of the water and the species living in it), or media studies (creating the documents and multi-media objects used to create the case for the solutions). Students in history, business, or citizenship classes take on the roles for governing officials to study science from the point of view of regulations, their objectives, and their timing.

The more realistic and diverse the roles, the more students can divide the activities to concentrate on specific content. This increases motivation and encourages students to remain focused on solutions. It also allows them to study the core science in the context of their personal strengths. The more completely the students incorporate their personal roles, the more they will act professionally when they consult people in the community who have responsibility for these duties.

Clarification of the Problem and Critical Thinking

The students are presented with the scenario and assume their roles. They begin to clarify the problem and determine the area in which their characters will focus their efforts. They must state the problem clearly, assume the tasks of their roles, and determine the focus for their solutions. This is an important step for the students and is the best indication of how well they understand the problem. The teacher's main task consists in nudging the students to a good understanding of the issues in the problem. In the river scenario, the focus could be organometallic contaminants from local industries and their effects on flora and fauna in the river. A second group could focus on contaminants of drinking water and the ways that they are eliminated. Work needs to be accomplished by any one group in a sufficiently speedy way to keep the project in perspective and on schedule in the curriculum year.

Content Acquisition

The students in their roles now begin to assemble content and create solutions. Sources of information may be the more traditional ones of newspapers, books, and videos or even films. However, these students benefit by being able to access content on the Internet and determine its worth, validity, and timeliness. There are often groups in the community who can act as online mentors who are identified by teachers and who can be accessed by email or who participate in the discussion groups as the students gather their information. Student interviews with members of the community are worthwhile since much needs to be mastered and organized before the students leave the school to interview off-site.

The teacher can assist with the accuracy and completeness of the content by directing members to a wide set of possible sources. At this point, traditional classroom lessons on core content are an asset. They may be face-to-face or online with checks that students have mastered the core ideas.

Activities

As the students gather their content, they begin to assemble and integrate it into solutions based on their new knowledge. It is important that they do many offline activities in natural, role-based groups so that the discrete content they have gathered can be taught, debated and authenticated by the whole group. Activities should be stepped so that students are not overwhelmed. Solutions should culminate in substantial products that are well-documented and complete. For instance, students could create a public policy paper calling for new chemical limits, with supporting documentation from other jurisdictions and their experiments with their local water sources and supplies. They might create a digital video to show members of government or the community the present case with a model and evidence for desirable change. The product depends on the context and capacity of the classroom.

Solution/Assessment

As the students work on their activities, they will create products which need attention from the teacher and mentors. If the students have not found sufficient content or have been sloppy in collecting and presenting evidence, the solutions posited may be superficial or even wrong. Teacher intervention can turn students to redress this and the solutions can go through iteration to ensure that students work much as developers and writers working in the 'real world'. In most cases, students enjoy the opportunity to learn more and their improving solutions become a source of pride. The students finish when they and the teacher are satisfied, but motivation remains high where initial goals and schedules are followed.

Exhibition

This model for learning benefits from an opportunity to exhibit solutions. Face-to-face events are optimal if much time has been spent using technology in groups separated by distance. A final event like an exhibit, a presentation to the local municipal council or even a synchronous event among schools supported by videoconferencing will enable students to polish products for a deadline and for someone else than their school and teachers. In some cases, an exhibition may be the only way to make students complete and move to other studies.

6. Implementation Notes

Teachers can approach this model in a variety of ways. They can start with a scenario that is exciting to students and work backwards to make the curriculum links. This will often happen to a certain extent because good teachers will think of various other parts of their curriculum that they are accomplishing in these problems such as communication, co-operative work, career study, or even the use of technology in their discipline.

Teachers often start with a relatively rudimentary scenario but as they begin to trust the focus and variety of approaches that the roles afford students, they invest more time and energy in the scenario or simulation description. Student motivation is directly proportional to the excitement of the scenario problem.

All sections, but particularly the core content and activities, are profitably produced on the web since the project web site will give students the framework for their work. Many teachers working on one project can make a substantial site with activities which will encourage other teachers to join them, use the project, and suggest improvements. A number of teachers will also help in establishing a solid foundation for student evaluation. Only if the curriculum objectives are apparent and the evaluation methods authentic will a critical mass of teachers in a jurisdiction adopt the project and make it worth the effort that has been expended by the first core teachers. Once this happens, the effort to enhance the site is minimal and the returns great.

The project model has been incorporated into a web application that allows teachers interested in initiating a project to create a web site which describes their problem, establishes their team, and establishes their 'lessons'. External teachers can request to join a team and then enhance the site with their additions. Projects that are very creative and attractive often grow out of this template environment to full web production supported at a provincial or national level.

In all of this activity, ENO is in varying degree enabling personal, small group and province- and nation-wide professional development. As such, some of our activities have been researched and monitored or even funded by research grants. We have yet to induce research into this model but many teachers in Ontario, Canada, and even around the world have adopted it.

6. Partnerships and Sustainability

Our work with the Ontario education community has burgeoned to other Ontario and Canadian government ministries and jurisdictions. This gives us economy of scale and allows us to move services through a developing spectrum not dependent on individual contracts.

We are working with Brazil to support secondary reform to integrated disciplines and critical thinking through technology. This involves four projects in at least seven states with nearly one hundred schools and hundreds of teachers over the next two years.

7. Summary

All of this experimentation, integration, and implementation create a healthy and knowledgeable corporation able to develop and offer vertically integrated services to communities, professional groups and government ministries and agencies. We use the economies of numerous parallel contracts to continually

improve our service and applications offerings. As we embark on our international activities, we invite participation and partnership.

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